THE BUTTERFLIES OF THE SAN BERNARDINO MOUNTAINS, CALIFORNIA.

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Three summer months in 1905 and two in 1906 were spent by the senior author in natural history field-work in the San Bernardino Mountains, California. Although attention was paid more particularly to vertebrates, many insects were obtained, and of these nearly 1000 Lepidoptera were secured, representative of the 51 species of butterflies enumerated in the present paper, besides a number of moths. The majority were taken about the head of the Santa Ana River, at elevations ranging from 5,000 to 8,500 feet.

During the season of 1906 Hilda Wood Grinnell was most active with the net, and several of the rarities were discovered through her continued watchfulness. Although we were not inclined to collect vast series (in fact our time had to be apportioned among several subjects), yet we were always on the lookout for things not previously collected.

We were especially interested in noting the zonal ranges of certain butterflies which seemed to be as sharply limited as some birds and mammals. And, as with the latter, certain other butterflies seemed to be spread broadcast, indifferently. But here it must be kept in mind that while imagines may range extensively, vertically as well as horizontally, the larvæ may feed exclusively on certain plants which are of very limited range. As with birds, it is the *breeding* range we should try to determine, though this is most difficult.

The life zones represented on the San Bernardino Mountains within the region worked include the Upper Austral, Lower Transition, Upper Transition, Canadian and Hudsonian. Each of these possesses many restricted and characteristic plants and animals. Naturally the former are most serviceable as earmarks.

The Upper Austral, which completely encircles this mountain group, the higher zones being arranged more or less concentrically within, is represented on the two slopes by remarkably different divisions or faunæ. It is characterized on the Pacific side by the scrub oak (*Quercus dumosa*), grease-wood (*Adenostoma fasciculatum*), and

several species of manzanita and *Ceanothus;* and on the desert side by the pinyon (*Pinus monophylla*) and sage (*Artemisia tridentata*), the latter also running up into Transition in places. (Of course there are many other good zone plants besides those mentioned here.) As is the case with the other zones, the Upper Austral is very variable in altitudinal extent, this being dependent upon slope exposure, air-currents and other factors. For further information along this line of investigation, we would refer the enquirer to an excellent paper by H. M. Hall, entitled "A Botanical Survey of San Jacinto Mountain" (Univ. of Calif. Pub.; Botany, Vol. I; pp. 1–140, Pls. 1–14; June, 1902).

The Lower Transition is the most extensive of the zones, covering a large very irregular area which interdigitates with the Upper Austral below, and merges above into the Upper Transition — wherever the latter occurs. It is the chief timber belt of the mountains and is occupied by the more or less open forests of yellow and Jeffrey pines (*Pinus ponderosa* and *P. jeffreyi*), incense cedar (*Libocedrus decurrens*), and golden and black oaks (*Quercus chrysolepis* and *Q. californica*).

The Upper Transition zone is chiefly recognizable by the prevailing presence of the white fir (*Abies concolor lowiana*), a buckthorn (*Ceanothus cordulatus*) and a manzanita (*Arctostaphylos patula*). From the Transition the Canadian zone is usually very abruptly marked off. One passes, within a few hundred feet, from the tall firs and pines of the former into the timber of lesser stature composed entirely of the tamarack or Murray pine (*Pinus murrayana*). The underbrush of the Canadian, where there is any, consists of the chinquapin (*Castanopsis sempervirens*), while one notices among flowers *Pentstemon cæsius*) as peculiar.

Above, the Canadian tamaracks become replaced more gradually by the more or less stunted limber pines (*Pinus flexilis*) characteristic of the Hudsonian zone, where we also found exclusively certain flowers, such as *Spraguea umbellata*, *Bryanthus breweri* and *Ranunculus eschscholtzi*. This zone is the most restricted one, occurring only along the crest of the lofty range just south of the upper Santa Ana and marked at the west end by San Bernardino Peak (10,060 feet) and at the east end by San Gorgonio Peak, the highest mountain of southern California (11,485 feet).

Butterflies were observed in the Hudsonian zone, but we found no

species there that we failed to find lower. In the Canadian zone the Murray pine woods were almost destitute of day-flying Lepidoptera, but the grassy cienegas, such as those at the headwaters of the South Fork of the Santa Ana, were well populated. Here, at an altitude of 8,000 to 9,000 feet, flying over the brilliantly green meadows dotted with lilac-colored shooting-stars (*Dodecatheon alpinum*) and white violets (*Viola blanda*) were found large numbers of the newly-named *Cupido hilda*. This blue seemed to be characteristic of the Canadian zone, and even though the mornings of the last week in June, 1905, when we were camped at one of the upper cienegas, were to us unpleasantly frosty, an hour or two's sunshine brought them out in swarms. We found this species also down well into Transition along cool canyon beds, but only sparingly. A number of lower-zone butterflies also flew about these Canadian cienegas, such as *Euvanessa antiopa*, *Aglais milberti* and *Lemonias augusta*.

In Upper Transition, by far the most abundant species of butterfly, and one invading but rarely above or below, was the San Bernardino checker, *Lemonias augusta*. This species was abundant in June (especially of 1905) about the blossoming buckthorn bushes.

In the Lower Transition, where, because of its great area, we spent most of our time, a great many butterflies were met with that were not seen elsewhere, and *may* have been exclusive inhabitants of this zone. But here we are unusually liable to error, in making too general statements as to distribution; for the Upper Austral was not as thoroughly worked, and may have yielded many of the same species. We will, therefore, in the list beyond offer whatever distributional data we took in more or less detail, leaving generalizations until the surrounding country has been more thoroughly surveyed.

We must emphasize the extreme value in systematic lepidopterology of recording *exact locality*, just as in the study of birds or mammals or any other group of living things. The greater portion of our literature on west American butterflies is sadly neglectful of this principle. Such locality-assignments as "California," "southern California," "interior valleys," or even "the San Bernardino Mountains," are almost meaningless, and should be avoided as the plague where anything better can be offered — and a specimen, the exact locality of which is unknown, should not be mentioned in print, at least from a zoo-geographic standpoint! Especially should a species never be described without a statement of the *precise* type locality. For the

habitat of a species is responsible for its characters, and the more minute the distinguishing features, the more necessary is a knowledge of locality-conditions and range.

1. Papilio rutulus Boisduval.

This was a plentiful species in the well-watered canyons of the Pacific slope of the mountains below 6,000 feet altitude. It was noted in Mill Creek and Mountain Home Canyons in June, and all along the Santa Ana up to within a mile of Big Meadows, 6,700 feet, from June 10 to August 5. The following examples were preserved: Fish Creek, at its confluence with the Santa Ana, 6,500 feet altitude, June 20, 1 ♂, June 26, 1 ♂, July 3, 1 ♀, 2 ♂♂, July 5, 1 ♀; near juncture of South Fork with Santa Ana, 6,200 feet, July 2, 2 ♂♂; Seven Oaks, 5,100 feet, July 7, 1 ♂.

2. Papilio zolicaon Boisduval.

This seemed to be a rare swallow-tail in the region worked, for only one example was encountered. This was on the Santa Ana at about 6,100 feet elevation, August 4, 1906.

3. Papilio asterioides Reakirt.

This almost black swallow-tail proved to be most common in the Lower Transition sage belt along the upper Santa Ana, above 6,000 feet. It is a strong flyer and wandering individuals were met with up through the black oak belt towards San Gorgonio Peak. One was even seen flying over the triangulation station on the very summit of San Bernardino Peak, 10,060 feet, July 12, 1905.

This species, often supposed to be identical with *indra* of Reakirt, is unquestionably distinct. It has been correctly described and figured in Wright's recent book, only the specimens figured there are poor and not quite representative of the average characters of the species. The ♂ of *asterioides* approaches *pergamus* quite closely. The female seems to be very variable, one example approaching uniform blackness. Specimens taken: Santa Ana Canyon, 6,100 feet, July 25, 1 ♀, 6,500 feet, July 27, 1 ♀; South Fork Santa Ana, 6,200 feet, July 26, 1 ♀; Lost Creek, 6,400 feet, July 31, 1 ♀; Fish Creek, 6,500 feet, June 20, 2 ♀♀, 1 ♂; same, 6,700 feet, June 11, 1 ♂.

4. Pontia occidentalis (Reakirt) Scudder.

One example from Seven Oaks, 5,100 feet, July 7, 1905, ♂.

5. Pontia protodice (Boisduval & Le Conte) Scudder.

A fairly common species along the hotter north side of the Santa

Ana in the Upper Austral and Lower Transition zones. Noted from Seven Oaks, 5,100 feet, nearly to Big Meadows, 6,700 feet. Two specimens: Santa Ana, opposite mouth of Fish Creek, 6,500 feet, June 19, ♂, July 5, ♀.

6. Pontia rapæ (Linnæus) Scudder.

One example — Santa Ana near mouth of Fish Creek, July 5, ♀.

7. Nathalis iole Boisduval.

This was a common species in warm open stretches along the upper Santa Ana. It was not seen outside of the belt of sage (*Artemisia tridentata*) among the clumps of which it was difficult to see when in flight. It seems to be a local butterfly everywhere, and somewhat erratic in times of appearance. Examples obtained: Santa Ana, opposite mouth of South Fork, 6,200 feet, July 2, 1 ♂; Santa Ana, opposite mouth of Fish Creek, 6,500 feet, June 20, 22 and 26, 3 ♂♂; same, July 5, 2 ♂♂; Fish Creek, 7,000 feet, June 17, 1 ♂.

8. Callidryas eubule (Linnæus) Boisduval & Le Conte.

Detected but once — a ♂ taken on the Santa Ana near the mouth of Fish Creek, 6,500 feet, June 23, 1905. It is rather surprising to find this species at such an altitude; for it is ordinarily noted chiefly around parks and gardens in the thickly settled and cultivated valleys of southern California.

9. Synchloë sara (Boisduval) Scudder.

One specimen — Fish Creek, 6,500 feet, June 19, ♂.

10. Zerene eurydice (Boisduval) Scudder.

This was a common and conspicuous species about the head of the Santa Ana, ranging up through Upper Transition. A shrub growing abundantly in the black oak belt (*Amorpha californica*) was particularly attractive to the ♀♀; while the ♂♂ congregated on clover patches and wet sand along the streams, sometimes as many as five alighted or fluttering close together. Two of the ♀♀ secured are of the so-called "variety *amorphæ*" which is very obviously but an individual variant of *eurydice*. Twelve specimens: Fish Creek, 6,500 feet, July 5, 10 and 23, 1 ♂, 3 ♀♀; same, 7,000 feet, June 30, 2 ♀♀; South Fork, Santa Ana, 6,200 feet, July 2, 2 ♂♂; same, 6,400 feet, July 20, 2 ♀♀; same, 7,500 feet, 1 ♀; Seven Oaks, 5,100 feet, June 27, 1 ♀.

11. Eurymus eurytheme (Boisduval) Scudder.

A common species on cienegas and in open woods up through

Transition. The last of July large numbers appeared about a flowering pennyroyal (*Monardella lanceolata*), and many were migrating up the Santa Ana low among the brush clumps. Series secured: Fish Creek, 6,500 feet, June 23 and 30, 3♀♀; same July 5, 1 ♂; Lost Creek, 6,400 feet, July 31, 1 ♀ (an albino); South Fork Santa Ana, 6,200 feet, July 2, 1 ♂, 1 ♀; south slope Sugarloaf, 6,700 feet, July 22, 2 ♂♂; Seven Oaks, July 7 and 9, 3 ♂♂; Bluff Lake, 6,500 feet, July 17, 21 and 28, 3 ♀♀.

12. Eurema nicippe (Cramer) Hübner.

Several examples of this species were seen along the Santa Ana in the vicinity of Seven Oaks early in July, when a ♂ was taken on the 7th at about 5,000 feet altitude.

13. Argynnis semiramis Edwards.

Perhaps the most abundantly represented species of the region. Its center of abundance was plainly the Lower Transition zone where it began to be common the last week of June. By July 20 most individuals were faded and battered, this process being no doubt helped along by the frequent thunder-showers often accompanied by sleet or hail. This butterfly was very active on warm days, and could only be caught with ease when feeding on its chosen flowers. These included the thistle (*Carduus bernardinus*), yerba santa (*Eriodictyon trichocalyx*) and pennyroyal (*Monardella lanceolata*). As somewhere in the San Bernardino Mountains was the type-locality of *Argynnis semiramis*, we secured specimens whenever opportunity afforded, with the following results: Seven Oaks, 5,100 feet, July 7, 2 ♂♂; South Fork Santa Ana, 6,200–6,400 feet, June 30–July 25, 14 ♂♂; Fish Creek, 7,000 feet, June 30, 5 ♂♂, 3 ♀♀; Santa Ana, 6,500 feet, July 25, 1 ♂, 1 ♀.

14. Lemonias augusta (Edwards) Dyar.

This very distinct but local species proved very numerous, especially in June, 1905, in the Upper Transition zone, where the blossoming buckthorn (*Ceanothus cordulatus*) constituted the chief attraction. Fresh, bright individuals began to appear in numbers by June 15 and by the last of the same month most examples looked pretty well battered. The series secured shows remarkable constancy of characters making this species one of the best-marked of the genus. Although in our experience chiefly confined to Upper Transition, yet suitable attractions brought individuals somewhat higher or lower, at

least temporarily. For instance near the summit of San Bernardino Peak, 10,000 feet, July 12, 1905, several were flying about a flower growing profusely close to the ground in sunny places (*Spraguea umbellata*). Twenty-nine specimens saved: South Fork Santa Aan, 7,500–8,500 feet, June 27 and 28, 22 ♂♂, 3 ♀♀; Fish Creek 6,500 feet, June 15 and 19, 2 ♂♂; Lost Creek, 6,300 feet, June 30, 1 ♂; Santa Ana, 6,200 feet, July 1, 1 ♀.

15. Phyciodes mylitta Edwards.

Noted but sparingly: Seven Oaks, 5,100 feet, July 7, 1 ♂; South Fork Santa Ana, 6,200 feet, July 2, 1 ♂, 1 ♀; Bluff Lake, 7,500 feet, July 18, 1 ♂.

16. Polygonia satyrus (Edwards) Scudder.

A few seen about nettle patches in the shade of the alders along the Santa Ana in the vicinity of Seven Oaks, 5,100 feet, where a ♀ was obtained July 7, 1905.

17. Eugonia californica (Boisduval) Scudder.

Two or three examples were seen around a cienega at 8,500 feet elevation near the head of the South Fork of the Santa Ana. One example, a ♀, was secured June 28, 1905.

18. Aglais milberti (Godart) Scudder.

One specimen: South Fork Santa Ana, 8,500 feet, June 29, ♂.

19. Euvanessa antiopa (Linnæus) Scudder.

Met with frequently along canyons and about clumps of rank herbage on mountain sides almost irrespective of altitude. Fish Creek, 6,500 feet, June 19 and 20, 3 ♂♂; cienega near head of South Fork Santa Ana, 8,000 feet, June 28, 2 ♂♂.

20. Vanessa huntera (Fabricius) Hübner.

This species suddenly appeared about the 20th of July, 1906, along the Upper Santa Ana, 6,200–6,700 feet. Specimens were bright and unworn, doubtless bred in the near vicinity. A ♂ was taken on July 22 and a ♀ on the 25th.

21. Vanessa cardui (Linnæus) Ochsenheimer.

Fairly common along the Santa Ana up through Lower Transition, but, interestingly enough, not far away from the white-flowered yerba santa (*Eriodictyon trichocalyx*). Three males secured: South Fork Santa Ana, 6,700 feet, July 25; south slope of Sugarloaf, 6,700 feet, July 22; Santa Ana, 6,500 feet, July 25.

22. Vanessa carye (Hübner) Hübner.

Seen only in the vicinity of Seven Oaks, 5,100 feet, where a few frequented the open places about the buildings.

23. Junonia cœnia Hübner.

This species, like *Euvanessa antiopa*, ranged almost everywhere, though, unlike the latter, preferring dry open intervals between bushes or tree-clumps. It was seen over on the desert slopes of the mountains (Doble, Cactus Flat, etc.), as well as on the Pacific side where the following specimens were taken: Fish Creek, 6,500 feet, June 19–July 5, 4 ♂♂, 3 ♀♀; South Fork Santa Ana, 6,200–8,500 feet, June 28–July 20, 4 ♂♂, 1 ♀; Seven Oaks, July 7, 3 ♂♂.

24. Basilarchia lorquini (Boisduval) Scudder.

One specimen: Fish Creek, 6,600 feet, June 29, 1906, ♂.

25. Limenitis californica (Butler) Edwards.

This handsome butterfly was seldom seen away from the golden oak (*Quercus chrysolepis*). None were seen above Lower Transition. It was a common species in the vicinity of Seven Oaks, 5,100 feet, and below. Two examples, both ♂♂, were secured on the upper Santa Ana, 6,200 feet, July 1; and two ♂♂ and ♀♀, brand new, in perfect condition were taken July 22 in a tongue of golden oaks which extend up across the south face of Sugarloaf, 6,700–7,500 feet.

26. Cercyonis paulus (Edwards) Dyar.

This identification for the "satyrids" obtained in the San Bernardino mountains is not satisfactory. The group needs thorough overhauling, with large series from numerous localities to work from. The species, whatever name it should bear, proved to be abundant in the Lower Transition zone, especially in this belt of black oaks (*Quercus californica*) which extends over the gentle slope on the south side of the upper Santa Ana. It was not noted above the belt, but was seen down into the upper Austral scrub-oak belt north of Seven Oaks, 5,100 feet. Although the flight of this butterfly is the usual slow, languid perambulation so characteristic of the family we found it often surprisingly difficult to capture, possibly because we failed to put the same dexterity and energy into its pursuit that we devoted to the more swift and agile species. *Cercyonis* seems to ignore the presence of any sort of flowers, and affects dry leaf-strewn ground under bushes, and trees. Out of 25 specimens there was but one ♀: South Fork, Santa Ana, 6,200–6,500 feet, July 1–26, 22 ♂♂, 1 ♀; Fish Creek, 6,500 feet, July 5, 1 ♂; Santa Ana, 6,100 feet, July 20, 1 ♂; south slope Sugarloaf, 6,700 feet, July 22, 1 ♂.

27. Anosia plexippus (Linnæus) Scudder.

None taken, but seen several times in July, 1906, along the Santa

Ana at Seven Oaks, 5,100 feet, and up to 6,200 feet, near the mouth of the South Fork.

28. Anosia strigosa (Bates) Scudder.

This species was seen about thistles at Seven Oaks, 5,100 feet, the first week in July. At Cushenbury Springs, 4,000 feet, on the desert edge of the mountains, a pair in copulation was secured on August 10, 1905.

29. Chrysobia virgulti (Behr) Scudder.

But one specimen: ♂, Fish Creek, 6,500 feet, June 20, 1905.

30. Atlides halesus (Cramer) Hübner.

This gorgeous species of "*Thecla*" was encountered but once, August 14, 1905, on the desert side of the mountains. It was along the road leading up the steep, rocky canyon from Cushenbury Springs to Cactus Flat, at about 5,500 feet altitude. The day was particularly hot and glary, even for this semi-desert region. Several examples of *Atlides* were seen along the road, alighting on Chrysothamnus bushes or flying among the dwarfed golden oaks. One perfect ♂ was captured with a hat.

31. Uranotes melinus (Hübner) Scudder.

This species was found in brushy places up through Lower Transition, and proved to be the commonest "theclid" of the region. Fish Creek, 6,500–7,000 feet, June 30–July 5, 4 ♂♂, 1 ♀; South Fork Santa Ana, 6,200–7,000 feet, June 27–July 2, 3 ♂♂; hillside near confluence of Bear Creek and Santa Ana, about 4,500 feet, one example, June 12.

32. Thecla dryope Edwards.

One specimen: ♀, South Fork Santa Ana (at mouth), 6,200 feet, July 2, 1906.

33. Thecla spinetorum Boisduval.

But two examples of this rare species were secured, both near the mouth of the South Fork of the Santa Ana: a ♂ July 2, 1906, at 6,200 feet, and a ♀ July 20, 1906, at 6,400 feet altitude. There seems to be some confusion in regard to this species. The examples figured as this species in Wright's book are different from ours and are with much probability the *Thecla johnsoni* Skinner, described from Washington. Mr. Herr took specimens of *spinetorum*, or something like it, on the desert side of San Jacinto Mountain several years ago.

34. Incisalia eryphon (Boisduval) Scudder.

One specimen: ♂, Fish Creek, 6,500 feet, June 22, 1906; caught

on patch of clover (*Trifolium wormskjoldi*) at the margin of the stream. This species has been previously found on the central Sierras in the vicinity of Lake Tahoe and the Yosemite Valley. If this is a Transition or Boreal species the present station would indicate a very interesting case of interrupted distribution. Specimens from the two regions have not been compared, so there may be slight differences as the result of the isolation afforded. We are under the impression that Mr. Herr obtained this or a closely similar species on San Jacinto Peak several years ago. The San Bernardino and San Jacinto mountains are only about fifteen miles apart in an air line, but the deep San Gorgonio Pass of Lower Austral zone lies between, which would seem to be a pretty effectual barrier to small butterflies. Extremely interesting results await the careful investigation of all these mountain groups.

35. Epidemia helloides (Boisduval) Scudder.

Coppers were rare in the region, and specimens were taken only at the margin of the Santa Ana, at the confluence of Fish Creek with it, 6,500 feet. Here 5 males were secured June 20–22, 1905.

36. Cupido fulla (Edwards) Scudder.

A fairly common species, often flying about a lupine (*Lupinus albicaulus*), as well as wet sandy stream-margins. Fish Creek, 6,500–6,700 feet, June 13–30, 3 ♀♀, 3 ♂♂; South Fork, Santa Ana, 6,200–6,700 feet, July 1 and 2, 4 ♂♂, 2 ♀♀; cienega at head of South Fork, 8,500 feet, June 28, 1 ♂.

37. Cupido hilda, new species.

MALE. — Expands 25–28 mm. Upper sides of primaries bright blue with a very wide black marginal border, becoming much broader towards the costal edge, where it occupies about half the distance from apex to discal spot; discal spot reniform, black. Secondaries almost entirely blue above, except for a narrower marginal black border, with a few black spots in anal angle. On the under sides the markings of the primaries are very heavy and pronounced: general color ashy gray; a black discal spot large and conspicuous, as are the other spots; next a row of round spots, forming an angled semicircle around the discal spot; at the end of this series are two small black spots placed close together and at right angles to the series; next a row of less distinct spots curved towards the costa and with two small spots on the inner margin at the end of the series; next a series of obscure patches forming a broken line; a narrow fimbriate marginal line. Secondaries below with very pronounced spots occupying nearly the same relative positions as those of the primaries, except that the inner three of the middle row enclose red spots and are sagittal in shape. Fringes of all wings white. Body grayish white.

FEMALE. — Expands 25–32 mm. Upper sides of primaries blackish brown varying to red-brown; on the outer half of the wing a bright band of red fading ou bet-

fore it reaches the costa and separated from the outer margin by an equal space of the ground color. On the hind wings there is a similar disposition of markings, except that the bright red band is broader and is separated from the outer margin by a narrower area of the ground color; two black dots in the angle more or less invade the red; this band does not quite reach the costa or inner margin. Under sides in color grayish brown; spots very pronounced and more or less transversely elongated; two heavy round spots between discal point and base; the arrangement is otherwise the same as in the male. Body grayish-brown inclining to blackish. Fringes grayish brown.

This species is readily distinguishable from *Cupido dædalus* Behr and other described forms by the bright red bands of the upper sides (in the ♀) which make a decided contrast with the ground color. In an occasional specimen the ground of forewings is reddish and so tends to obliterate the red band; but in our considerable series this is an exception. The heavy spots of both sexes are also characteristic, as is also the deep brown, inclining to reddish, of the females.

This is the same thing that is figured in Wright's "Butterflies of the West Coast" as *dædalus*, but *hilda* is easily separable from *dædalus* by the characters just indicated. The two specimens figured by Wright seem to be extremes or else the color-photography has not succeeded in showing well the contrast between ground color and band.

The group to which *Cupido hilda* belongs is subject to great variation geographically, and has been neglected unduly. Large series of specimens from all over the country will be required for a proper study of the group.

Types of the new species above described are retained in the Grinnell collection. Topotypes will be deposited in the U. S. National Museum. The type-locality is the upper cienega at the head of the South Fork of the Santa Ana, at an elevation of about 8,500 feet (according to the San Gorgonio Quadrangle Topographic Sheet, U. S. G. S.). Here the species was numerous the last of June over the cold Canadian meadows, appearing in the forenoons after the sunshine had dispelled the frost. Although taken at lower elevations, the species was nowhere else so well represented. Our series includes the following examples: Cienega at head of South Fork of Santa Ana, 8,500 feet, June 27 and 28, 1905, 7 ♂♂, 29 ♀♀; South Fork, 6,200 feet, June 28–July 7, 1906, 12 ♂♂, 5 ♀♀; Fish Creek, 6,500 feet, June 22, 1905, 3 ♂♂, 1 ♀; Santa Ana, 5,800 feet, July 20, 1906, 1 ♀.

38. Rusticus enoptes (Boisduval) Scudder.

Three examples: ♂♂, Fish Creek, 6,500 feet, June 23, 1905. These specimens agree with the figure in Wright's recent book, and are no doubt distinct from *acmon* and other species, but we are quite sure true *enoptes* is a different thing. The problem remains to be worked out.

39. Rusticus acmon (Doubleday & Hewiston) Scudder.

A fairly common species widely distributed, as follows: Santa Ana, 6,200–6,500 feet, June 19–July 26, 6 ♂♂, 1 ♀; South Fork, 6,400 feet, July 20, 1 ♂; cienega at head of South Fork, 8,500 feet, June 28, 2 ♂♂; cienega on south slope of Sugarloaf, 6,700 feet, July 22, 1 ♀.

40. Hemiargus isola (Reakirt) Scudder.

Two examples: Fish Creek, 6,500 feet, June 23, 1 ♂; South Fork Santa Ana, 7,000 feet, June 27, 1 ♀.

41. Leptotes marina (Reakirt) Scudder.

Seen sparingly in the black oak belt, especially around a shrub (*Amorpha californica*) occurring only in that belt. Fish Creek, 6,500 feet, June 19, 1♂; South Fork Santa Ana, 7,000 feet, June 27, 1♂.

42. Copæodes candida Wright.

Two specimens: Santa Ana, 6,500 feet, July 25, 1906, 1♂; near mouth of Fish Creek, 6,500 feet, June 19, 1905, 1♀. Wright records this from the San Bernardino Valley, but it evidently occurs also to quite an elevation in the mountains.

43. Ochlodes agricola (Boisduval) Scudder.

Three ♂♂, Fish Creek, 6,500 feet, June 19, 1905.

44. Thymelicus sylvanoides (Boisduval) Dyar.

Fish Creek, 6,500 feet, June 18, 1♂.

45. Erynnis columbia (Scudder) Scudder.

This was by far the most abundant skipper in the region, ranging up into the Canadian zone about cienegas. The greatest numbers appeared to occur in Lower Transition, where on beds of clover along streams it convened in the hottest part of the day along with the blues. It was numerous also in the open woods of the black oak belt flying about and alighting upon almost any sort of herbage. The thistles were favored more than any other flower, though yerba santa was a close second.

There is considerable variation in our series in the color of the under sides of the secondaries and in size, but all seem to belong to the same species.

Seven Oaks, 5,100 feet, July 7, 1 ♀; Fish Creek, 6,500 feet, June 22–July 5, 14 ♂♂, 6 ♀♀; South Fork Santa Ana, 6,200–7,000 feet, June 30 and July 1, 10 ♂♂, 5 ♀♀; cienega towards head of South Fork, 8,500 feet, June 27, 1 ♀; cienega on south slope of Sugarloaf, 6,700 feet, July 22, 1 ♀; Bluff Lake, 7,500 feet, July 18–21, 3 ♂♂ 1 ♀.

46. Epargyreus tityrus (Fabricius) Hübner.

This showy skipper was common in the Lower Transition zone to which it appeared to be exclusively confined. The largest numbers were obtained around thistles (*Carduus bernardinus*) in the black oak belt. Fifteen examples: Fish Creek, 6,500–7,000 feet, June 20–30, 2 ♂♂, 7 ♀♀; South Fork Santa Ana, 6,200–6,700 feet, July 1–24, 3 ♂♂, 3 ♀♀.

47. Thorybes mexicana (Herrich-Schaeffer) Scudder.

Four examples: Fish Creek, 7,000 feet, June 30, 1 ♂, 1 ♀; South Fork Santa Ana, 6,200 and 7,000 feet, June 27 and July 1, 1 ♀ ♂.

48. Thanaos funeralis (Scudder & Burgess) Dyar.

Two examples; Fish Creek, 6,500 feet, June 23, 1 ♀; Bluff Lake, 7,500 feet, July 21, 1 ♀.

49. Thanaos tristis Boisduval.

This black skipper occurred in relatively small numbers up through Lower Transition. It was taken about bare wet sandy places in the canyons, and on flowers of thistle (*Carduus bernardinus*). The eight specimens secured agree fairly well with *tristis* as described in Wright's book, but are somewhat smaller with some differences in the white-spotting of the fore wings. It may be that a new name is needed, but we deem it better to wait for a much-needed revision of this difficult genus. Fish Creek, 7,000 feet, June 30 and July 5, 1 ♂, 1 ♀; South Fork, 6,200–6,700 feet, June 30–July 24, 3 ♂♂, 1 ♀; Seven Oaks, 5,100 feet, July 7, 1 ♂; Bluff Lake, 7,500 feet, July 21, 1 ♀.

50. Pyrgus montivaga (Reakirt) Dyar.

Noted commonly only in the sage belt, barely into Lower Transition. Its light color blended so closely with the gray tone of the sage (*Artemisia tridentata*) as to make it very difficult to discern even in flight. Seven Oaks, 5,100 feet, July 7, 1 ♂; Fish Creek, 6,500 feet, June 19, 1 ♂; same, 7,000 feet, June 30, 1 ♂.

51. Hesperia ericetorum (Boisduval) Dyar.

But one specimen: ♂, Fish Creek, 6,500 feet, July 5, 1905.